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EFFECTIVENESS OF TRANSBOUNDARY COLLABORATIVE CONSERVATION IN VIRUNGA NATIONAL PARKS

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ABSTRACT

The general aim was to assess the effectiveness of transboundary collaboration in the contiguously adjoining protected areas of Virunga massive. The specific objectives were, a) to identify the role of different stakeholders in the management of transboundary collaboration, b) to assess the level of collaboration between the three authorities and governments, c) to assess the participation of local communities in planning and management of the natural resources, and d) to establish the effectiveness of the approach in managing natural resources. The study employed both the primary and the secondary data sources. The questionnaires were used to collect data from officers and the discussion with relevant officials was conducted. A total 90 local community members were interviewed from the three countries. The secondary data were collected from management of Mgahinga National Park, Parc Nationaux des Volcano of Rwanda, Parc National des Virunga IGCP staff and crossection of protected areas stakeholders and government institutions of the three countries. The Results indicated that regarding the collaborative management between the three authorities, it was found out that information exchange and joint patrol were the major activities. By 2003, in Uganda poaching had reduced to 1 case and the wire snare to 54 which accounted for 2.3% and 8.8% respectively from the 23.3% and 19.6% in 1997. However the figures in Rwanda reduce slightly due to the security situation. It was also discovered that the local communities of DR. Congo and Rwanda were highly involved in planning of conservation activities that the case with Uganda.

Keywords: transboundary collaboration, effectiveness and conservation

ABSTRAK

Seacara umum tujuan penelitian ini adalah untuk menilai efektivitas kerjasama lintas batas di kawasan lindung Virunga. Tujuan penelitian yang lebih spesifik, a) untuk mengidentifikasi peran berbagai pihak pengambil keputusan dalam pengelolaan kerja sama lintas batas, b) untuk menilai tingkat kerja sama antara tiga pihak yang berwenang dan pemerintah, c) untuk menilai peran serta masyarakat lokal dalam perencanaan dan pengelolaan sumber daya alam, dan d) untuk menentukan efektivitas pendekatan dalam mengelola sumber daya alam. Penelitian ini menggunakan dua sumber data: primer dan sekunder.

Kuesioner digunakan untuk mengumpulkan data dari pejabat. Selain itu, dilakukan pula diskusi dengan pejabat terkait. Secara keseluruhan, sejumlah 90 anggota masyarakat lokal yang berasal dari tiga negara diwawancarai. Data sekunder diperoleh dari staf bagian pengelolaan Taman Nasional Mgahinga, Taman Nasional Gunungapi Rwanda, Taman Nasional Virunga yang diperuntukkan bagi Konservasi internasional untuk gorilla, dan seluruh pihak pengambil keputusan di kawasan lindung serta lembaga pemerintah dari ketiga negara terkait. Hasil penelitian menunjukkan bahwa terkait pengelolaan kolaboratif antara ketiga negara, pertukaran informasi dan patroli bersama merupakan kegiatan utama. Pada tahun 2003, perburuan di Uganda telah berkurang menjadi 1 kasus dan ditemukannya kawat perangkap menjadi 54 kasus, yang masing-masing menjadi 2,3% dan 8,8% dari angka sebelumnya 23,3% dan 19,6% pada tahun 1997. Meski demikian, angka untuk hal yang sama di Rwanda menurun sedikit dikarenakan situasi keamanan. Selain itu, diketahui pula bahwa masyarakat setempat dari Republik Demokratik Kongo dan Rwanda sangat terlibat dalam perencanaan kegiatan konservasi di Uganda.

Kata kunci : kerjasama lintas batas, efektivitas dan konservasi

INTRODUCTION

There are many instances worldwide of long-standing interactions and cooperation between two or more adjoining protected areas that are divided by international or sub-national boundaries. It has long been recognized that such areas have symbolic value for peaceful cooperation between nations as well as practical benefit for coordinated or joint conservation management. This is because natural resource boundaries do not follow administrative or political boundaries. As early as 1932, the Warton – Glacier International Peace Park was designated to commemorate the long history of peace and friendship between Canada and the United States of America and to emphasize both natural and cultural links [*Sandwith et al*. 2001]. More recently, several initiatives have explored the potential for developing such linkages not only through transboundary protected areas (*TBPAs*), some of which may be managed as a single unit by the country or jurisdictions involved, but also situations where transboundary natural resources management does not involve protected areas [*Griffin*, 1999].

Transboundary cooperative action is a highly strategic means of achieving regional integration, and securing landscape - level conservation at scale not possible previously. A giant step was taken on 12th May 2000 when President Festus Moghai of Botswana and President Thabo Mbeki of South Africa officially opened the Kgalagadi Transfrontier Park (*KTP*) as the world's first formally designated transfrontier park. The KTP brings together the 28,400 km^2 Gemsbok National Park in Botswana with the 9,591 km^2 Kalahari Gemsbok National Park in South Africa as a single unit under a unified system of central and management [*Sandwith et al*. 2001]. The Virunga Massif region, a contiguously separated Protected Areas of Parc National des Volcans (*PNV*) of Rwanda, Parc National des Virunga (*PNVi*) of Dr. Congo and Mgahinga Gorilla National Park (*MGNP*) of Uganda's move towards transboundary initiative is the right direction. They are found on a fragile ecosystem of Africa i.e. highland.

All life on earth is part of one great inter-dependent system. It interacts with and depends on the non-living components of the planet: atmosphere, oceans, fresh waters, rocks and soils. Humanity depends totally on this community of life as biosphere of which *Homo Sapiens* are an integral part *WRI, IUCN and UNEP*, [1992]. Uganda is a home to a remarkable array of ecosystems and biological species, which is critical to the lives of her citizens. For Ugandans, biodiversity and ecosystems are a matter of survival. Their livelihood depends on free and open access to a great variety of biological resources for food, fuel wood, medicines, housing and other constructional materials and economic security [*BSP*, 1993].

Key ecosystems of which the country boasts of include tropical highlands and lowland forests, the mountains, rivers and grassland wilderness areas and some of these are transfrontier in nature, contiguously adjoining to the protected areas in neighbouring countries [*Asuma*, 2002].

International border areas contain some of the most biologically intact ecosystems in the world, many of which are located in remote and inhospitable areas [*BSP*, 2001]. International borders are political rather than ecological boundaries; however, key ecological systems and components therefore occur in two or more nations and are often subject to a range of management and land-use practices, which may be conflicting. To ensure that future generations can have sufficient access to natural resources, and thereby secure livelihoods, management of water catchments, ecosystems, and migratory wildlife management must become more multinational and participatory across local, national and international levels [*Griffin*, 1999]. Efforts to manage the ecological, socio-cultural, and political and concerns of stakeholders across the boundaries in such must be considered [*Hamilton*, 1996]. Transboundary cooperation in conservation offers opportunity to sustainably manage shared ecosystems and natural resources that are contiguously beyond international borders. There are currently 169 complexes of two or more adjoining protected areas that are divided by international boundaries [*Zbicz*, 2001]. They involve a total of 666 protected areas representing 113 countries. There are varying levels of cooperation and formalization of cooperative management agreements within these complexes. Many are already *TBPAs* whilst others where the necessary cooperation is currently absent, have the potential to become *TBPAs*.

The International Gorilla Conservation Programme (*IGCP*) is a joint initiative among the three protected area authorities and three non-governmental conservation organizations: the Institute Congolais pour la Conservation de la Nature (*ICCN*), the Office Rwandais du Tourisme et de Parcs Nationaux (*ORTPN*), the Uganda Wildlife Authority (UWA), the African Wildlife Foundation (*AWF*), Fauna and Flora International, and World Wide Fund for Nature (*WWF*). The *IGCP* was launched in 1991, with the goal of ensuring the survival and the long-term conservation of the mountain gorillas and the regional afromontane forest's biodiversity in the northwest Rwanda, southwestern Uganda and eastern DR Congo i.e. in the Virunga volcano Massif. In long term view to establish *TBPA* between these three countries, ostensibly it was to create opportunities for enhanced transboundary cooperation in their management. It was also to encourage friendship and reduce tension in the border region. Indeed other potential benefits are:

1. Promoting international cooperation at different levels and in different force;
2. Enhancing environmental protection across ecosystems;
3. Facilitating more effective research;
4. Bringing economic benefits to local and national economies;
5. Enhancing the survival and the long-term conservation of the mountain gorilla and the regional afromontane forests biodiversity in the Virunga Volcano Massif.
6. And ensuring better cross-border control of problems such as fire, pests, poaching, river/water pollution and smuggling amongst the tripartite sovereign nations.

The above transboundary cooperation in conservation offers the prospect of sustainable management of the Virunga Massif. Transboundary Natural Resources Management (*TBNRM*) has been severally defined : "*any process of cooperation across boundaries that facilitates or improves the management of natural resources to the benefit of all parties in the area concerned* " [*World Bank*, 1996].

THE METHODS

The Mgahinga Gorilla National Park (*MGNP*) in Uganda and also in the contiguously adjacent neighbouring Parks of Parc National des Virunga

is located in the south western tip of Uganda, in Kisoro District, within the greater Virunga Volcano ranges montane ecosystem. It is further part of the Albertine Rift region, (the western part of the Great Rift Valley named after King Albert. Albert rift is shared by Burundi, DR. Congo, Rwanda and Uganda, southwards into Tanzania, Malawi and Mozambique.

The *MGNP* is part of the Virunga or Bufumbira chain of volcanoes [*Lebrun*, 1960], forming an arc along the Albertine Rift Valley. They are covered and surrounded by high and medium altitude forest that spans the borders of the eastern DR Congo, northwestern Rwanda and southwestern Uganda. *MGNP* is the Albertine Rift and it lies between latitudes of 1^0 30' 32" and 1^0 45' 03" South, and longitudes 29^0 3' 15" and 29^0 18' 10" East [*Mugiri,* 2002]. It is 600 km from Kampala, the capital city of the Republic of Uganda.

Topography and Precipitation

Topographically, the Albertine Rift characterizes the landscape; and the basement geological formations are Precambrian of volcanic rock, dating far back in the Pleistocene era, during the orogenesis (mountain building) eras. The landscape consists of the three inactive volcanoes of Muhavura, Gazing and Sabinyo, which lie in a line from east west along the Rwandan border [*Kingdom*, 1990]. Other volcanoes include Visoke, Karisimbi and Mikeno, the former two are shared between Rwanda and DR Congo. Altitude ranges between 1100 m and 4511 m above sea level. The region has a very high rainfall amounts with mean ranging from 1500 - 2500 mm per annum. Experiences temperatures modified by the altitudinal variations in the relief with 50 to 200 degrees Celsius and relative humidity of over 80% [*Butynski and Kalina*, 1993].

Vegetation and Biodiversity

The residual forests of *MGNP* form part of once continuous forests cover identified by ecologists as the Albertine Rift Afromontane region Forests across Southwestern Uganda, Northwestern Rwanda and eastern *DRC*. The high level of rainfall and altitudinal range of between 1100 m and 4511 m have caused many and varied habitats and the differences in the park biodiversity. The *IUCN* recognized this and categorizes *MFNP* having great species richness and diversity, with a high proportion of endemic species and significant members of rare and threatened wildlife such as Mountain Gorilla, *Gorilla gorilla beringei* [*IGCP,* 2001]. *MGNP* covers 3,400 ha and abuts much larger Parc National des Volcans in Rwanda [*Butynski* and *Kalina,* 1993]. The vegetation follows broadly altitudinal zones with an alpine zone (with giant senecio and *Lobelia*) above a sub alpine or *ericaceous* belt (moorland and tree healthier forest) at the top of the mountains; with montane forest *(hagenia hypericum*) and extensive bamboo forest (*Arundinaria alpina*) below it. The vegetation belts are variable on the three mountains, with Muhavura having an extensive area of sub alpine grassland. Below the bamboo zone, ever occurred extensively, but this has been largely cleared for agriculture [*UNP,* 1966]. The plant species list for *MGNP* stands at 276 species [*UNP*, 1996]. *MGNP* forests served as a faunal refuge during the late Pleistocene arid phase. The park's species diversity is thought to be high although recording is incomplete. Some 39 species of mammal have been recorded, and over 89 are suspected to occur [*UNP*, 1996]. These include eleven primate species most notably the mountain gorilla *Gorilla gorilla beringei* and the golden money *(Cercopithecus mitis sp*). *Werikhe*, [1991] found eight groups of gorillas; certainly they are more groups now. They mainly use the bamboo zone. Other species found are the forest elephant (*Loxodonto africana),* the Cape buffalo (*Cyncerus caffer caffer),* Bushbuck *(Tragelaphus scriptus),* Blue duikers *(Cephalophus monticola),* Bush babies (*Galago senegalensis*) among others [*Estes*, 1992].

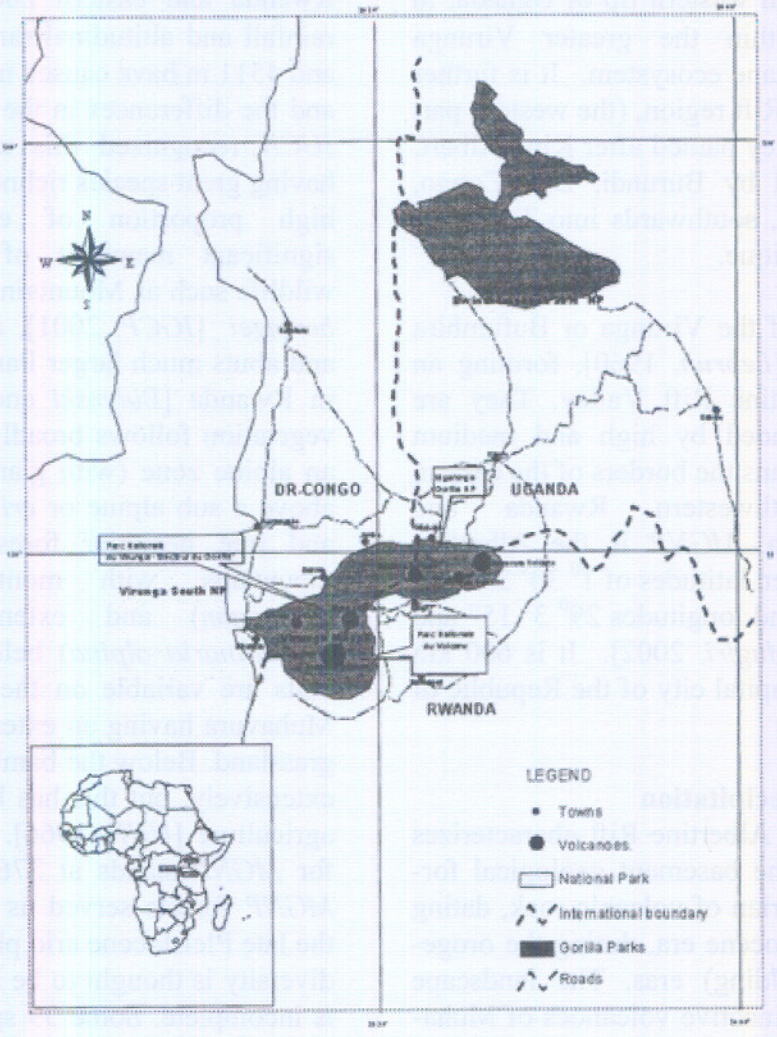

Figure 1. Location of Mgahinga Gorilla National Park

The inhabitants

The area surrounding the afromontane and the medium altitude forest of the Virunga volcano massif and *MGNP* in particular is densely populated, with county wide per capital rural population densities averaging 300 persons per km^2 [*IGCP*, 1997]. These population densities increase around the park owing to the rich natural resources and soil. The entire sub-region has human population to a tune of 910,700 [*IGCP*, 1997]. With an average regional population growth rate of over 3%, the overall population will grow well over one million in the near future [*IGCP*, 1996]. Over 90% of the people in the area are the ethnic Banyarwanda, Bafumbira and the minority Batwe, who are the most beleaguered.

Agriculture is the main economic stay of these communities with regard that PAs recourses do not currently exist. However, it is asserted by PA managers that local communities rely on and regularly exploit the protected area resources for the following:

1. Water, wood for fuel and construction, bamboo, animals and plants for food, medicinal purposes and bee keeping [*Bensted – Smith, et al.* 1995].
2. Other aspects of community livelihoods include:- ecotourism, trading, agriculture, livestock keeping, crafts work marketing and employment [*Adams and Infield*, 1998].

Of late however, anarchy, confusion and political turmoil have reigned in this region, though at different periods. This, to some extent, has influenced conservation activities either positively or otherwise. Besides the above concerns, the ecosystem is bisected by international boundaries, pressure from regional population increase and threats from the regional political events and uncoordinated land use plan and activities on either side of borders all pose serious threat to this critical conservation zone. This has constituted the basis for the selection of the study and the study site.

The Virunga Volcano Massif, including *MGNP* and Bwindi Impenetrable National Park (*BINP*) are two forest blocks found in the Albertine Rift region. The *MGNP* is on the Uganda side of the ecosystem fronting DR Congo and Rwanda's Parc National des Virunga (*PNVi*) and Parc National des Volcans (*PNV*) respectively. This area used to form an extensive forest massif which has slowly been eroded by human use, encroachment and accelerated deforestation during the twentieth century resulting in fragmentation leaving small islands of forests separated by large expanse of agricultural lands. These two forests blocks make up the only habitat of the mountain gorilla found in the Bwindi forest block and in the Virunga Volcano Massif of which MGNP is part. Besides, other key issues and challenges that undermine the ecosystem are: the bisecting of ecosystems by international boundaries with different land use practices, threats from regional political upheavals and lack of regional framework.

The *IGCP* has been working in this region to develop and institutionalize transboundary collaboration framework between *UWA's MGNP*, *ORTPN's PNV* and the *ICCN's PNVi*. The goal of *IGCP* is to enhance the conservation status of the mountain gorilla (gorilla beringei) and the regional afromontane forests. Record *Lanjou et al.* [2001], *Helgar*, [2003] indicates that *IGCP* and the *MGNP* have collaborated at field level though supporting communication planning and cooperation in collaborative activities. Regional meetings, wardens' coordination meetings, joint patrols and cross border visits and gorilla census are some of the activities carried out. However, since the inception of this Programme, little has been done in terms of assessing the impact and significance of this initiative. Further it is to know if the initiative for transboundary collaboration was by protected area (*PA*) staff, and if, as a result of joint tourism and law enforcement patrol activities, *MGNP* has realized increased revenues and decline in illegal activities. Information on a complete breakthrough in the political will and support at national level are inadequate. The area continues to be a hot spot for insecurity contrary to the progammes' intentions for peace. Legal and policy issues and ecological monitoring are in early stages of formalization. Collaboration with sister ministries over natural resources, and integrated regional land use management are aspects that have not yet been investigated. Community support and involvement, the control and regulation of the wildlife products across customs are areas that require investigation. No research has been done in field on the significance of collaboration between *MGNP* and their counterparts of *PNV* of Rwanda and *PNVi* of DR. Congo. The level of development and differences in protected area facilitation; colonial orientation and differences in policies and language are some of the areas that require investigation for they have implications in transboundary conservation in the study area.

Objectives of the Study

The overall objective of the study was to assess the effectiveness of transboundary collaboration in the study area with of Mgahinga Gorilla National Park in relation to all stakeholders and the contiguously adjoining protected areas of Virunga and Volcano National Parks of DR Congo and Rwanda respectively.

Specific objectives were:

1. To identify the roles of different major stakeholders in the management of transboundary collaboration and conservation in the study area.
2. To assess levels of collaboration between Mgahinga Gorilla National Park, and neighbouring Protected Areas of *PNV* and *PNVi* of Rwanda and Dr. Congo respectively.
3. To assess the participation of the local communities in the planning and management of the natural resources.
4. To establish the effectiveness of this approach in conserving natural resource in the three countries.

Methods of Data Collection

This study used both primary and secondary data. Primary data collection was through direct field observations in the three national parks. Questionnaires were used to collect data from offices and discussions with relevant official of the national parks were conducted. Secondary data was collected from management of Mgahinga Gorilla National park, Parc Nationaux des Volcano of Rwanda, Parc National des Virunga *IGCP* staff and crossection of protected areas stakeholders and government institution such as National forest authority (*NFA*), Migration, Customs and security agents and non government organization. Protected areas wardens of tourism and community conservation organizations were interviewed. A total of 90 local communities members were interviewed from the three countries.

RESULTS AND DISCUSION

Major Stakeholders Role and interests in Transboundary Natural Resources Management.

An assessment of stakeholders' roles and interest in the region was carried out to ascertain their relevance to transboundary efforts in *MGNP* and the Virunga Massif. Key stakeholders seen working in the area included: International Gorilla Conservation Programme (*IGCP*), Mgahinga Gorilla National Park (*MGNP*), Parc National des Volcans (*PNV*), Parc National des Virunga (*PNVi*), Dian Fossey Gorilla Fund International (*DFGFI*), Local Government (*LG*), National Forestry Authority (*NFA*), Agricultural Department (*AD*), National Environment Management Authority (*NEMA*), Customs, Army (*UPDF*), World Wide Fund for Nature (*WWF*), World Conservation Society (*WCS*), Institute for Tropical Forest Conservation (*ITFC*) and political leaders. The results are presented in Table 1.

Table 1. Institutional stakeholders' roles in relation to transboundary conservation efforts in MGNP

Stakeholders Objective	No. of Institution	%
Conservation	10	58.8
Collaborative Management	10	58.8
Research and Monitoring	7	41.1
Participatory Planning and Ecotourism	3	17.6
Sustainable Development	3	17.6
Security	2	11.8
Curbing illegal Trade	2	11.8
Local Awareness Raising	1	5.9
Weather Monitoring	1	5.9

Source: Field data

From the table can be observed that natural resources conservation management and collaborative management are the major objectives of stakeholders in the area (58.8% and 58.8% respectively), followed by research and monitoring (41.1%). This indicates that a growing interest of several stakeholders in transboundary issues were to promote transboundary management and to conserve the natural resources.

Collaboration between Mgahinga Gorilla National Park and PNV of Rwanda and PNVi of Dr Congo

During the study, it was realized that there are instances of interaction and cooperation between *MGNP* of Uganda, PNV of Rwanda and PNVi of DR Congo. In the study, collaboration was defined to mean joint activities, and these were describe to include information exchange on gorilla health, security, and planned joint/mixed patrols. Other joint activities included Chief wardens meetings, joint patrols, gorilla census, wardens coordination meetings, gorilla health monitoring and cross visits and regional stakeholders meetings over the last six years, and are shown in Table 2.

Table 2. Joint activities between *MGNP*, *PNV* and *PNVi*

Activity	No. of activity	%
Information exchange	216	50.8
Chief wardens meeting	18	4.2
Joint patrols	57	13.4
Gorilla census	2	0.5
Gorilla health monitoring	36	8.5
Wardens co-ordinations meeting	36	8.5
Cross visits	36	8.5
Regional stakeholders meetings	24	5.6
Total	425	100.0%

Source: Field data

Altogether eight activities are jointly carried out at an agreed time interval among the three Protected Area Managements, coordinated by IGCP. Information exchange is the highest, (n = 216, 51.8%), followed by joint patrols by rangers from *MGNP*, *PNV* and *PNVi* of Congo respectively. Gorilla health monitoring, Wardens coordination meetings and cross visits all tied in the fourth position, (n = 36, 8.5%) and, gorilla census is the least done activity, this is because it is done once after every seven years.

Field-Based Coordination and Collaboration: Anti Poaching and Law Enforcement

In the study, law enforcement is defined to mean, the routine process and activities carried out by Park rangers with the objective to minimize or scale down illegal activities in a protected area, largely through arrests and prosecutions. This also includes removal of wire snares. An assessment of joint anti-poaching and law enforcement activities in the study area was based on question of issues jointly handled since the progamme started.

Table 3. Field Based Coordination and Collaboration in Anti Poaching and Law Enforcement

Year	No of Patrols	Joint Patrols with DRC		Joint Patrols with Rwanda	
		(#)	(%)	(#)	(%)
1996	5	3	60.0	2	40.0
1997	12	7	58.3	5	41.7
1998	8	0	0.0	8	100.0
1999	4	2	50.0	2	50.0
2000	0	0	0.0	0	0.0
2001	9	4	44.4	5	55.6
2002	9	2	22.2	7	77.8
2003	6	0	0.0	6	100.0
2004	4	0	0.0	4	100.0
Total	7652	57	18	39	68.4

Source: National parks data

Since the inception of the transboundary collaboration, anti-poaching and coordinated patrols have been among the several joint activities. From Table 4, fifty-seven patrols were conducted in the last nine years (n=57) of which eighteen were with *DRC's PNVi* (n = 18; 31.6%). Results further reveal that there were more joint patrols between Uganda's *MGNP* and Rwanda's *PNV* than joint Patrols between Uganda's *MGNP* and *DRC'S PNVi*. The above coordinated patrol results are further illustrated by Table 5. There were fluctuations in the operations. The existing levels of cooperation are because of staff commitment in times of political uncertainties in the area. The aspects of common border frontage in the *PA* have also significantly contributed to the attained levels of cooperation.

In promoting and enhancing cooperation for conservation in the Virunga region, coordinated joint patrols have been employed. However this cooperation declined to no cooperation (0%) in 1998. This is attributed to the liberation war of 1997-98 that started in Eastern DR. Congo that ousted the regime of Mobutu Sese Seko, and all protected area activities are stopped including patrols.

A 50% rise in cooperation in 1999 was due to a brief interlude of peace restoration by the new government in Kinshasa. Also, earlier on, Uganda closed her borders with DR. Congo as a goodwill gesture of international cooperation in the Great Lakes region on non-conflict proliferation in the area. The fluctuation/trend knocked lowest again (0%) in 2000, again when insecurity cropped up in the area, following rebels resurgence. Protected area operations of Uganda's *MGNP* were confined to the Park only. Cooperation resume in 2001 at 44.4% level but declined to 22.2% and then to 0% cooperation by 2003. This low cooperation between *PNVi* of DR. Congo and Uganda's *MGNP* may also be due to a short border contact of 2-3 km in the PA, unlike the 20 km with Rwanda's *PNV*. Differences in languages, poor logistics and low staff emoluments in *PNVi* also explain this scenario. Cooperation with Rwanda's *PNV* started on a low key and steadily picked-up from 40% in 1996 to 100% by 1998. This was the period of peace. From late 1998 to 2000, the Park (*PNV*) became insecure when rebels came in. Both Uganda and Rwanda closed their common borders. This had far reaching consequences and joint patrols were halted. However, low scale cooperation resumed by 2001.

Table 4. Summary of Joint Patrols between *MGNP*, *PNV* and *PNVI*.

Joint Patrols	No. of Joint Patrols (x)	Percentage (x/n)%
MGNPVs PNVi	18	14.9
MGNP Vs PNV	39	32.2
PNV Vs PNVi	64	52.9
Total	121	100.0

Source: Field data

An evaluation of joint patrols between *MGNP* of Uganda, *PNVi* of DR Congo and *PNV* of Rwanda was done (Table). The results show that *PNV* had nearly twice as much joint patrols with *PNVi* of DR Congo (n= 64; 62.1%) and only 39 joint patrols with *MGNP* (n=39; 37.9%). This may be due to: *PNV* and *PNVi* of Rwanda and DR Congo respectively, share a common border distance of 65-70 km in the Virunga Massif, and this makes it all the more reason for collaboration. Besides, more than ten families of habituated gorillas in the region are located in the region between the two *PAs*. Also, the two countries are of francophone background thus easing filed communication, unlike their Ugandan counterparts of Anglophone background. Additionally *MGNP* is the smallest *PA* within the massif (Figure 1).

Collaboration in Anti-Poaching Between *MGNP*, *PNV* and *PNVI*

Analysis of patrols indicates that both DR Congo's *PNVi* and Uganda's *MGNP* managements have participated in joint and mixed patrols for at least six years from 1996 to 2003. The trend shows that generally Rwanda cooperated more with *DRC* (mean percentage, 52.9%) than with Uganda (mean percentage 32.2%).

Cooperation with *DRC* dropped from 60% in 1996 to zero (0%) in 1998. This is attributed to the unstable political situation and insecurity in the PNVi when the *RCD* Gome rebels infested the area and paralyzed Park operations. There was rise in cooperation by 50% in 1999. This is when the Rwandan forces occupied the area and flashed out the rebels. A decline followed with a drop to zero cooperation (0%) in 2000 following Rwanda people defence force withdrawal. The situation stabilizes in 2001 with mean of 44.4% level of cooperation. These trends also show the determination and zeal of DR Congo's staff to collaborate with their colleagues across the borders despite these political upheavals.

Effectiveness of Transboundary Collaboration between *MGNP* and *PNVi*

In general results show that there have been more joint patrols between *PNV* of Rwanda and *PNVi* of DR. Congo with a mean of 51.5% and less with MGNP with a mean of 35.9% during 1996 to 2003.

The popularity of *TBPA* in the conservation of rich biological resources found in border areas, and these can best be protected by cross border cooperation with the right vision [*ITTO and IUCN*, 2003]. Results indicate that the local *PA* managers on the ground had shared vision. This study found that this was locally based initiative at field level. It was a bottom-up process. Although building formal links in the region was difficult due to political volatility, it should not be considered as impossible, since efforts through informal initial stages can be made to enhance the cooperation. The findings tally with *Zbicz*, [1999], that emphasises the significance of personal contacts as basis for cooperation. The wardens in the field conceptualized and shared the vision and the idea of the need for some field level collaboration between *MGNP*, *PNV* and *PNVi*. The wardens provided visionary and pragmatic leadership in the early stages of this initiative. These findings tally with *Zbicz*, [1999] when employees from adjoining *PAs* are taking the hesitant step to build mutual trust and

relationships. These face-to-face meetings appear to be one of the key factors most instrumental to early stages of cooperation in the Virunga massif between *MGNP*, *PNV* and *PNVi*. This has been the case with the Virunga. Currently the region boasts of moderate level of attainment of cooperation in communication and regional level ecological monitoring and development of skills. The current level of landscape ecosystem management has culminated into the signing of the tripartite agreement between *UWA*, *ORTPN* and *ICCN* in Goma, DR. Congo in 2003. The central role of modern communication technology in the process cannot be over emphasized in this Virunga initiative.

Effectiveness of Transboundary Collaboration between the Management Units

Aspects such as illegal human activities in *PA*, population dynamics of Virunga gorillas, trends in property damage and problem of animal management, and patrol coverage were assessed to determine the program effectiveness. Assessment of illegal human activities inside the park was observed for a period of seven years and the results revealed in the following Table 6.

The highest number of poachers for *MGNP* was recorded in 1997. This was attributed to less foot and joint patrols and community outreach and sensitization were low. The lowest number was attained in 2003. In *PN*, the highest number was in 1997, following the invasion of the area in 1998, no data is available. Work resumed in 2001 with success record of reduction in poachers. The overall drop in poachers arrested was 17.3%. Analysis of wire snare too reveals a good trend in the effectiveness of collaboration management.

Table 5. Illegal human activities in *PNV* and *MGNP*

	MGN-Uganda				PNV-Rwanda			
Year	Poachers	%	Wire snares	%	Poachers	%	Wire snares	%
1997	10	23.3	120	19.6	35	30.2	439	20.2
1998	8	18.6	129	21.0	-	-	-	-
1999	7	16.3	101	16.5	27	23.3	506	23.3
2000	7	16.3	82	13.4	-	-	-	-
2001	6	14.0	71	11.6	21	18.1	482	22.2
2002	4	9.3	56	9.1	18	15.5	388	17.8
2003	1	2.3	54	8.8	15	12.9	360	16.6
Total	43	100	613	100	116	100	2175	100

Source: Field data

Table 6. Population dynamics of Virunga gorillas

Year	Population Characteristics	Area
1990	325 all age categories	Virunga
2000	380 all age categories	Virunga

Source: Secondary data

A study by a team of scientists, supported by the *IGCP* in the Virunga indicates that gorilla populations have increased by 17% by 2003, at a growth rate of 3% over the last 10 years (1990-2000), giving it a total population of 380 in Virunga region. This excludes the 320 individuals found in the Bwindi Impenetrable National Park

Table 7. Property damage incidences and their management trend in *MGNP*-Uganda

Year	Buffalo wall length Built	Incidences of Property damage	(%) percentage change	Affected people	(%) percentage change
1998	1.2 km	202	24.8	51	36.7
1999	2.3 km	165	20.3	44	31.7
2000	2.3 km	150	18.5	20	14.4
2001	1.5 km	122	15.0	16	11.5
2002	1.7 km	111	13.7	6	4.3
2003	1.0 km	6.3	7.7	2	1.4
Total	10.0 km	813	100.0	139	100.0

Source: *MGNP* 2000

Table 8. Property damage Trends in *PNV*-Rwanda

Year	Buffalo wall length built	Incidence of property damage	%	Affected of homesteads	%
2000	4.6 km	242	43.3	68	31.9
2001	4.4 km	141	25.2	62	29.1
2002	3.8 km	112	20.0	53	24.9
2003	2.2 km	64	11.5	30	14.1
Total	15 km	559	100	213	100

Source: *PNV* (2004)

Table 9. Property damage trend in *PNVi-DR*. Congo

Year	Wall length	Incidence of damage	%	Affected homesteads	%
2000	2.7 km	93	36.3	55	44.4
2001	1.7 km	80	31.3	41	33.1
2002	1.8 km	63	24.6	20	16.1
2003	2.8 km	20	7.8	8	6.4
Total	9.0 Km	256	100	124	100

Source : *PNVi* (2004)

Table 10. Coverage of Joint Patrols from 1999 – 2003

Year	Area covered per joint patrol in Km2	Patrol coverage increase (%)
1999	4.5	12.1
2000	6.6	17.8
2001	7.2	19.4
2002	8.8	23.7
2003	10	27.0
Total	37.1	100

Source: *MGNP* (2004)

Harmonisation of policies and legislation and relevant instruments

The three countries have sound economic and development policies, though on the whole they vary. *DRC* and Rwanda were still lagging behind. In Uganda there exist sectoral policies on forest, environment and national biodiversity strategy and plans. These could be used in protecting biodiversity in the country. Both Rwanda and DR. Congo need to fine tune their national strategic plans and policies to manage biodiversity.

CONCLUSION

From the findings, it is evident that transboundary initiative in the greater Virunga region among the three protected areas was developed locally among the managers and has the chance of local acceptance and further development. Through coordination of field-based activities, illegal activities have reduced drastically, although it varies from country to country due to the political and social situations prevailing in the different countries. However communities around the protected areas have no knowledge about transboundary issues in Uganda, although Rwanda and *DRC* indicated some involvement and participation. There are differences in capacity and commitment among the three countries because of differences in national policies and in language.

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